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# Growing

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# Summer

CURRENT SERIAL RECORDS

# Cover Crops



Farmers' Bulletin No. 2182

U.S. Department of Agriculture

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# Growing Summer Cover Crops

Prepared by Crops Research Division, Agricultural Research Service

The most commonly used summer cover crops are alfalfa, red clover, soybeans, cowpeas, velvetbeans, sweetclover, and lespedeza. Other cover crops, both legumes and non-legumes, usually are grown under exceptional conditions.

Alfalfa, sweetclover, and red clover are used in rotations as cash crops and as crops to turn under for green manure. Soybeans, cowpeas, and velvetbeans are used in rotations as cash crops, as crops to turn under for green manure, and as crops to grow in combination or intermixed with corn. Lespedeza is used as a cash crop in rotations and, to a limited extent, for green manure.

Summer cover crops are grown for a variety of purposes and under a wide range of soil and climatic conditions. General recommendations that apply to all the situations in which summer cover crops are grown cannot be made. For specific recommendations on the most effective use of summer cover crops,

consult with the Agricultural Extension Service agent or the Soil Conservation Service technician in your county, or with specialists at your State agricultural college.

Because cropland is normally used during the summer season to grow income-producing crops, summer cover crops are less widely grown on cropland than are winter cover crops. Using cropland an entire summer season exclusively for a cover crop is practical only in exceptional situations (for example, when the succeeding crop is a permanent one and good seedling establishment is essential).

## CULTURAL PRACTICES

### Inoculation

Inoculation is essential for profitable production of all legumes. Seed should be artificially inoculated, unless it is known that the soil contains organisms that will do the inoculating naturally. Use commercial cultures for artificial



inoculation. Cultures are available at seed stores; directions are on the label.

Florida beggarweed, cowpeas, velvetbeans, lespedeza, alyceclover, hairy indigo, and common sesbania usually are naturally inoculated in regions to which they are adapted. All other legumes should be inoculated the first time they are grown in a field.

## Fertilizer

A heavy growth is ordinarily desired, and commercial fertilizer may be necessary to insure it. Obtain recommendations from the county agent or another specialist familiar with conditions in your area, or follow recommendations based on soil analysis.

## Scarification

Many legumes have a high percentage of hard seeds that will not germinate readily without scarification. All such seed should be scarified before it is planted if prompt germination is desired.

Several kinds of scarifying machines are on the market. Part of the seed is scarified when it is threshed or hulled. Hullers with rasp cylinders and concaves usually scarify a high percentage of seed.

If you buy seed, find out from the dealer whether it is scarified.

## Seeding

The table below lists recommended seeding rate.

Striate and Korean lespedeza should be seeded in late winter or

*Rate of seeding summer cover and green-manure crops*

Crop	Quantity needed to plant 1 acre	
	Broadcast or in close drills	In 3-foot rows
	<i>Pounds</i>	<i>Pounds</i>
Alfalfa.....	15 to 20	3
Florida beggarweed.....	15 to 20	3
Cowpeas.....	80 to 100	20
Common lespedeza.....	15 to 20	-----
Kobe lespedeza.....	20 to 30	-----
Korean lespedeza.....	15 to 20	-----
Sericea lespedeza.....	20 to 35	4 to 5
Red clover.....	10 to 15	3
Sesbania.....	25 to 30	4 to 5
Soybeans.....	60 to 100	20 to 25
Sudangrass.....	20 to 25	4 to 5
White sweetclover.....	12 to 15	3 to 4
Yellow sweetclover.....	12 to 15	3 to 4
Velvetbeans.....	100 to 120	25 to 30
Alyceclover.....	15 to 20	3
Hairy indigo.....	6 to 10	3 to 4

early spring. Alfalfa, sweetclover, and red clover generally are seeded in the fall in the South, and in the spring elsewhere. All other crops listed in the table should not be seeded until all danger of frost is past.

## Turning Under

Cover crops grown on cropland usually are turned under and incorporated with the soil; the growing plants may be turned under, or the plant residue (stubble) may be turned under. Sometimes the stub-

ble of summer cover crops is left on the land over winter, and turned under in the spring. Regardless of whether the living plant or the stubble is turned under, the practice is called green manuring.

Turning under the crop is so common that the terms "cover crop" and "green-manure crop" often have the same meaning.

If the cover crop is turned under for green manure, allow 2 to 4 weeks for the material to decompose before the next crop is planted. Decomposition is most rapid if the soil is moist and the weather is hot.



Ind—60523

Turning under a cover crop of ryegrass and sweetclover.

Young, succulent plants decompose much faster than mature plants.

Plant the following crop soon after the turned-under material decomposes; otherwise, nutrients liberated by the decomposition will be lost by leaching or by conversion into gas that escapes into the air.

## CROPS COMMONLY USED

### Alfalfa

Alfalfa is a perennial legume. It is long-lived, upright, and deep-rooted.

**Adaptation.**—There are many varieties of alfalfa. Choose a suitable variety for the section of the country in which it is to be grown.

**Uses.**—In the irrigated apple orchards of the Mountain and Pacific States, alfalfa is sometimes used as a cover crop. In the truck-crop areas of the Southwest it is popular for preceding or rotating with truck crops such as lettuce and cantaloup.

Alfalfa is sometimes grown in the North as a summer annual for turning under; nonhardy kinds are used for this purpose more often than are the hardy kinds.

**Management.**—When alfalfa is grown in an orchard, the hay may be cut, and left to form a mulch, or it may be left standing until it dies, and allowed to mat down. Orchards are often disked during the fall and winter to reduce the fire hazard from accumulated dry material, to incorporate some of the organic matter with the soil, to de-

stroy hiding places of insects and rodents, and to put the ground in shape to facilitate irrigation.

In growing alfalfa in orchards with trees under 4 years old, see that the trees get sufficient water and nutrients.

When alfalfa is grown for a cover or green-manure crop, the time, rate, and method of seeding are the same as when the crop is grown for hay.

### Sesbania

Sesbania is an upright annual legume that attains a height of 6 to 8 feet. In thin stands, it is moderately branched; in thick stands, the lower branches either fail to develop or are shed early and the upper branches are rather light and leafy.

**Adaptation.**—Sesbania does well in the Southwest if irrigated or if grown where sufficient soil moisture is available. In the Southeast, where its use is limited, it is grown primarily on heavy soils. Sesbania grows rapidly when temperatures are high; slowly when temperatures are low. Growth is slow and yields are small in northern latitudes.

**Uses.**—Sesbania is used only for turning under—its ability to quickly produce a heavy tonnage of material for turning under makes it especially useful where land can be given over to this purpose during the midsummer season. In the Imperial and Coachella Valleys of California and in the Yuma and Salt River Valleys of Arizona, sesbania is grown for turning under on fields that produce winter truck crops.



**Management.**—Nematodes are common in the roots of sesbania, but apparently do little damage. However, nematodes may attack succeeding crops if these crops are subject to nematodes. Consider this risk.

Artificial inoculation is not required.

## Cowpeas

Some varieties of cowpeas are viny; others are semiviny. Plants are fairly leafy.

**Adaptation.**—Cowpeas are grown in the South on a wide range of soils; they apparently do as well on sandy soils as on clay soils.

**Uses.**—Commonly used for turning under, cowpeas compare well

with other crops in the production of material for turning under. They are also valuable as a forage and seed crop.

**Management.**—Do not seed until ground is thoroughly warmed. When planted in rows 3 feet apart, about 20 pounds of seed per acre are required; when broadcast, 80 to 100 pounds per acre are required.

Inoculation usually is not necessary if cowpeas have been grown in a locality for many years. Inoculate when cowpeas are grown for the first time.

Whippoorwill, Iron, Victor, Buff, Bragham, New Era, and Groit are among the best varieties.

**NOTE:** Cowpeas are subject to attack by nematodes, bacterial canker,



A sesbania green-manure crop.

Tex—49,628



and fusarium wilt—all of which often do considerable damage.

## Florida Beggarweed

Florida beggarweed is an annual upright legume that attains a height of 4 to 7 feet. Most of the leaf growth is in the upper part of the plant. The main stem is sparsely branched; in thick stands there are few branches.

**Adaptation.**—The plant is a native of tropical and subtropical America. It occurs naturally as far north as the southern part of the United States. It is grown primarily in Florida and the southern part of Georgia and Alabama. Under favorable conditions it will make fair growth as far north as Michigan, Minnesota, and Wisconsin, but in northern latitudes it seldom can compete with summer weeds.

Florida beggarweed does best on a rich sandy loam soil, but is not exacting in its requirements. Its ability to grow on moderately acid soils is of particular value.

**Uses.**—The crop is used for turning under. It is most useful on sandy loam soils in rotations where a volunteer crop can be handled.

**Management.**—If seed is allowed to mature, Florida beggarweed will

volunteer, but it does not reseed well except on cultivated land. Cottongrowers sometimes object to this volunteering habit; the mature seed adheres to the lint of the cotton.

Delay seeding until all danger of frost is past. It can be sown in early corn at the time of the last cultivation.

Artificial inoculation is not necessary.

## Lespedeza (Annual)

Striate and Korean are the only two species of annual lespedeza. Both are spreading upright plants that attain a height of 6 to 18 inches. The stems are small and leafy, and branch freely in thin stands.

**Adaptation.**—The striate varieties, common and Kobe, are late maturing. The Korean varieties, Summit, Yadkin, Rowan, and Climax, mature earlier. The striate varieties are widely grown from the Ohio River southward. The region to which the Korean varieties are adapted extends farther north and includes New Jersey, southeastern Nebraska, and the southern parts of Iowa, Illinois, Indiana, Ohio, and Pennsylvania. Korean varieties usually are not recommended for Florida and areas along the Gulf coast, because the striate varieties are better adapted.

**Uses.**—Annual lespedezas are used for midsummer and late-summer grazing, for turning under, for hay, and for seed.

**Management.**—The annual lespedezas make very little growth

### CROTALARIA

Crotalaria generally is not recommended as a cover crop because the seeds are poisonous.

until warm weather occurs, but continue to grow until fall. Seed should be sown in late January in the lower South, and in early April in the northern parts of the region of adaptation. When plants are allowed to stand sufficiently late to mature a seed crop, volunteer growth will be maintained from year to year.

The root-knot nematode attacks lespedeza on dry sandy land and may do serious damage to most varieties. On such land the nematode-resistant varieties, Rowan and Yadkin, are recommended.

The organism that inoculates lespedeza is widely distributed and artificial inoculation is seldom required.

## **Lespedeza (Sericea)**

*Sericea lespedeza* is a long-lived perennial legume.

**Adaptation.**—*Sericea lespedeza* will grow on soils of greater acidity and lower fertility than will most other crops. It is adapted to the same general region as Korean lespedeza.

**Uses.**—*Sericea lespedeza* is suitable for forage and soil improvement. No crop is superior to it, in the region where it is adapted, for controlling erosion on poor acid soils and increasing the soil fertility.

**Management.**—*Sericea lespedeza*, being a long-lived perennial legume, is particularly well suited



NC—30,017-C

**Korean and sericea lespedeza on gullied area.**

for planting on eroded, unproductive soils to improve fertility so that eventually profitable crops may again be grown. In acreage reduction programs in the Southeast, sericea planted on the surplus acres can be maintained at little cost for a period of years and at the same time greatly improve the soil. Seed crops may be harvested annually to defray maintenance costs; seed harvest does not lower the crop's soil-improving value.

Since sericea lespedeza becomes established slowly, it should not be used in short rotations.

## Red Clover

Red clover is an upright-growing legume. Whether it grows as an annual, biennial, or perennial depends upon conditions where it is used.

**Adaptation.**—In the lower South red clover is principally a winter annual; in the Corn Belt and Northeast it lasts for two years. In parts of the West stands may persist for three or more years. Varieties differ in their characteristics, and there is a wide range of soil and climatic conditions to which different varieties are adapted.

**Uses.**—Red clover is commonly used in crop rotations—often as a summer crop for turning under; also as a crop to produce both hay and material for turning under.

**Management.**—When used for both hay and turning under, the first growth is cut for hay and the second growth is turned under. Another way of handling it is to cut the first crop for hay, then harvest a

seed crop and return the straw to the land. When only the stubble is left in the fields the soil will benefit from the nitrogen gathered by the nodule-forming bacteria that live on the roots.

In most regions red clover is seeded in the spring, 10 to 12 pounds of seed being used per acre. Because red clover has been grown over such a wide area, the organism that inoculates it is usually in the soil. In areas where it has not grown before, artificial inoculation is necessary.

## Soybeans

The soybean is an upright legume native to northern China. It was introduced into the United States early in the 19th century.

**Adaptation.**—In the United States it is grown mostly east of a line passing through the middle of the Dakotas and south through central Texas.

**Uses.**—Soybeans are grown primarily for seed, but are used for forage and turning under.

**Management.**—When soybeans are used for a green-manure crop, late-maturing varieties usually give the largest yields. When they are used as a regular crop in rotations, varieties should be selected that will give high yields of seed or hay, as the grower may desire. For green manure the crop should be sown broadcast or in close drills, 60 to 100 pounds of seed being used per acre—the amount sown depends on the size of the seed, which varies with varieties.

Inoculate when soybeans are sown on land where the crop has not



been previously grown; otherwise it is not necessary.

## Sudangrass

Sudangrass is a nonlegume that belongs to the sorghum group, but it is only moderately coarse. The upright stems attain a height of 3 to 5 feet. Maximum diameter is about equal to that of a lead pencil.

**Adaptation.**—Sudangrass does best in a warm climate. However, it is grown in areas in the North where it was once thought to be wholly unadapted; it produces good hay crops as far north as Michigan and New York. In the Rocky

Mountains, conditions are generally unfavorable except in the irrigated valleys.

Sudangrass is not exacting in its soil requirements. It does best on a rich loam, but it has been grown successfully on almost every soil type.

**Uses.**—Sudangrass is an especially suitable crop for turning under in the summer between truck crops, or in other situations where a very limited time can be allowed for producing a green-manure crop.

**Management.**—Seed should be sown in close drills or broadcast, 20 to 25 pounds per acre. The time



SD--196

Short rotation cover crops of cane and sudangrass.



of turning under should be determined with reference to the time of planting the succeeding crop and not to the stage of development of the sudangrass. Ordinarily, succulent sudangrass will decompose rapidly, and shortly after it is turned under the soil will be in condition to receive the succeeding crop. When the plants are more mature, a longer time is required. Mature sudangrass turned into the soil will reduce the available nitrates for a time; therefore the crop should not be used as green manure unless ample nitrogen fertilizer is applied or a long period can elapse before it is necessary to use the land.

A number of improved varieties of sudangrass are adapted to various areas of the United States. Consult your county agricultural agent for variety recommendations for your area.

## Sweetclover

The two species of sweetclover grown extensively in the United States—white and yellow—are upright-branching, leafy legumes. Annual and biennial forms occur in both species.

The growth that the biennials make the year of seeding depends on soil and moisture conditions, and usually is in the range of 12 to 24 inches. They reach a height of 4 to 5 feet the second year.

Depending upon the variety grown and the time of planting, the annuals may grow from 3 to 6 feet in height.

**Adaptation.**—Sweetclover will grow almost anywhere, provided there is sufficient lime in the soil and the annual rainfall is more than 17 inches and well distributed. It is very resistant to cold, drought, and heat. Sweetclover is able to obtain phosphorus from relatively unavailable soil phosphates and consequently will grow on soils where alfalfa or red clover requires phosphate fertilization. It will grow on soils too high in alkali for alfalfa and most cultivated crops.

A limiting factor in growing sweetclover in the Northern States is the sweetclover weevil, *Sitona cylindricollis* Fahr. The spread of this insect since 1940 has caused more farmers to stop using sweetclover than any other factor. No varieties are resistant to this insect.

The insect, a small dark gray snout beetle, feeds upon the leaves of the young seedlings, either killing the plants in a short time or weakening them to such an extent that the plants die from unfavorable summer weather conditions. While the weevil feeds upon the second year's growth, the damage is relatively slight because of the rapid rate of growth of the shoots.

Since overwintering and newly emerged adult sweetclover weevils migrate from old stands to new seedlings, sweetclover should not be planted close to an old stand if it can be avoided.

**Uses.**—Sweetclovers are used primarily for pasture and soil improvement. No other plant known will furnish as much spring grazing



Ida—175

**Sweetclover cover crop that was seeded with barley in alternate rows.**

under so wide a range of conditions as will a good stand of sweetclover in its second season. The value of sweetclover as a soil improver lies in its ability to take nitrogen from the air through the nodules on the roots, and to store the nitrogen in roots, stems, and leaves. When the crop is turned under, it decays and the nitrogen becomes available for the next crop.

**Management.**—Both species need lime and cannot be grown successfully in most parts of the eastern half of the United States unless the soil is limed.

Inoculation usually is not necessary in areas west of the Mississippi River where alfalfa is naturally inoculated. In most areas east of

the Mississippi River, artificial inoculation is essential.

Sow seed on well-prepared firm soil at the rate of 12 to 15 pounds of seed per acre. In the lower South, seeding should be done in the fall. In the North, seedings are made in early spring. Cover fall broadcast seedings with a harrow. Early spring seedings in the North need not be covered.

### **Velvetbean**

The velvetbean is a vigorous-growing annual legume. Most varieties are viny; they attain a stem length of 40 feet or more if conditions are favorable. The crop is not damaged by nematodes.

**Adaptation.**—The velvetbean is

a semitropical plant, and in the United States is adapted only in the South. It is one of the best crops for sandy soil.

**Uses.**—Because velvetbeans are hardy, yield heavily, and decay readily, they make an excellent green-manure crop. Although the crop makes excellent livestock feed, it is seldom cut for hay because it is difficult to handle. Velvetbeans are grown for the seed crop.

**Management.** — Velvetbeans should not be sown until the soil is well warmed, or a little later than the time for planting corn. Seeding 25 to 30 pounds of seed per acre, in rows 40 inches apart, is recommended.

Artificial inoculation is not necessary; the organism that inoculates velvetbean is present in the soils of the South.

When the beans are grown for seed it is essential to plant them with a supporting crop such as corn to insure free circulation of air and to prevent the flowers from decaying without setting seed.

## Alyceclover

Alyceclover is a summer annual legume that normally has a low-spreading habit of growth; it is somewhat erect in thick stands. It attains a height of 2 to 3 feet.

**Adaptation.**—Recommended for Gulf coast region only.

**Uses.**—Alyceclover is a hay and pasture crop, and in the citrus and tung groves of Florida is used as a cover crop.

**Management.**—Seed in late spring at a rate of 15 to 20 pounds of seed per acre.

Application of superphosphate and potash is necessary on some soils, and their application increases plant growth on practically all soils.

Seed inoculation is not necessary.

Nematodes may do serious damage on soils that have grown alyceclover for several years.

## Kudzu

Kudzu is a long-lived perennial legume with a viny habit of growth.

**Adaptation.**—Kudzu is adapted to the same general region as lespedeza—that part of the country south of the Ohio River and east of the Great Plains.

**Uses.**—It is recommended for gully erosion control and will prevent soil washing when used as a hay crop. As a hay and pasture crop it is equal to alfalfa in feeding value but is somewhat more difficult to handle because of its viny growth.

**Management.**—Kudzu should be left a number of years before being plowed under in the rotation.

## Hairy Indigo

Hairy indigo is an upright-branching summer annual legume that attains a height of 4 to 7 feet. It has moderately coarse stems that become woody with age, and leaves that resemble vetch leaves. There are two distinct types: A large strain that matures in November, and a smaller strain that matures in October. Hairy indigo is highly resistant to nematodes.

**Adaptation.**—The plant is native to tropical Asia, Australia, and



**Hairy indigo cover crop in an orchard.**

Fla—D39-2

Africa. In the United States the late strain is adapted only to the southern half of Florida; the early strain is adapted as far north as the southern half of Georgia. It grows fairly well on moderately poor sandy soil.

**Uses.**—Hairy indigo is used for forage, green-manure, and seed crops.

**Management.**—In Florida, if hairy indigo is allowed to mature and drop its seed, the seed will germinate and volunteer a crop the next year. An intercrop may be established in corn after the last cultivation from volunteer plants; the soft seed germinates early and the seedlings are killed by cultivation, but the hard seeds do not germinate until after the last cultivation.

Three hundred to five hundred pounds of 0-14-10, 0-10-10 or equivalent fertilizer often gives appreciable growth increases; hairy indigo has a comparatively low lime requirement.

Seedings can be made from March until the last of May, but early seeding is preferred. Use 3 to 4 pounds of seed per acre when drilled in close drills, and 6 to 10 pounds when broadcast in a well-firmed seedbed. Seed the smaller quantity when the crop is grown for forage or green manure.

Artificial inoculation is not necessary.

### **Miscellaneous Legumes**

A number of legumes not normally used as summer-growing crops for green manure or soil cover





Cal—6611

### **Turning under barley and vetch cover crop in orchard.**

are sometimes used for these purposes in the northern United States. Hairy and common vetch, crimson clover, and black medic—all winter annual legumes in the South—can be spring seeded in northern areas as summer-growing legumes. Alsike and Ladino clover are perennial legumes sometimes grown for only a few months before they are turned under.

Some of these legumes are seeded in pure stands, but seeding with grain is more common. Maximum yields for green manure are secured

from seedings made early in the spring.

### **Weeds**

Weeds are usually thought of as plants that should be destroyed, but much of the vegetation that is commonly termed weeds contributes large quantities of organic matter to the soil. Whenever weeds can be utilized for green manure without sacrificing needed ground moisture and plant food, their presence can be an advantage rather than a detriment.